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The influence of user interaction and participation in social media on the consumption intention of niche products

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ABSTRACT

Social media may be particularly adept at promoting niche products because of the tendency of consumers to participate in generating reviews and discussing such products, thereby raising interest in them. In this study, we investigate how patterns of user interaction in discussing a niche cultural product may influence participation levels, which in turn enhance consumption intentions. We show that higher levels of participation can indeed enhance consumption intention. Furthermore, interaction patterns with high inclusiveness and betweenness centralization may enhance participation levels, whereas out-degree centralization and core-periphery have a detrimental influence. Implications for research and practice are discussed.

1. Introduction

Businesses today are increasingly deploying social media (e.g., forums, blogs, wikis, and social networking services) to conduct their commercial activities; this paradigm shift has been termed social commerce [19,43]. It is believed that the content that is generated through user interaction and participation in social media (e.g., word of mouth (WOM)) could drive product sales [15]. As a corollary, social media have been hailed as a democratizing platform that enables consumers to discover and discuss niche products that have previously been ignored by mainstream media [22]. Niche products are products inthe "long tail"; they are made and marketed for use in a small and specialized market but can nonetheless be profitable given sufficient distribution channels[1] [4,20]. Such products are typically less available in the market because of their specialized target consumer segments compared with popular products that are meant for the mainstream markets [22].

By facilitating mass interaction and participation among consumers, social media platforms could promote conversations on niche products and enable both existing andpotential enthusiasts to obtain information on products that is otherwise unavailable in the offline or traditional media. In the offline context, it has been suggested that consumers have a tendency to engage in WOM to discuss less-known and unique products, motivated by a desire to appear more intelligent and more helpful in the eyes of their interlocutors [52]. Similarly, in the online context, it has been indicated that consumers prefer to contribute WOM to products that are less available in the market [22][2]. Collectively, these findings suggest that social media may serve as a particularly apt platform for promoting niche products, and the extent of user participation in generating content (e.g., WOM) relating to such niche products may play a crucial role in this aspect.

However, there remains a lack of research on what may influence the level of user participation in generating content (e.g., reviews and discussion) related to a niche product. The currently limited studies have focused on the perceived benefits that users may derive from contributing content [32] or the characteristics of products, such as brand reputation [3], perceived quality [21], and availability [22]. Our study may complement and extend the extant research in two important ways. First, we focus on niche products whose sales may benefit greatly from social media platforms but have thusfar received inadequate attention [22]. In particular, we are interested in niche products of a cultural type, which conveys "ideas, symbols, and ways of life", such as books

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[1] There are also niche products that profit by charging a premium price (e.g., luxury goods). In this study, we focus on niche products that benefit from the "long tail".

[2] The study also finds that consumers have a tendency to contribute reviews for popular products, suggesting a U-shaped curve such that popular product types and niche product types attract the most reviews.

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[57, p. 85]. Cultural products can typically be classified into different genres based on the perceived similarities in what they convey (e.g., "philosophy" and "novel" for books). Prior research suggests that the genres of cultural products vary greatly in their appeal to particular consumer segments, some of which are niche markets (e.g., the "philosophy" book genre compared to the popular "novel" genre) [44]. Thus, niche cultural products are particularly suitable candidates to benefit from the discussions that are generated on social media platforms.

Second, with product characteristics anchored on those of niche cultural products, we surpass individual perceptual factors and consider how users may influence one another in their social interaction in this context. Building on the social network analysis (SNA) paradigm, we investigate social interaction factors in terms of how specific patterns of interactions may influence the level of user participation in generating content for niche cultural products. SNA affords a systematic understanding of different forms of social interaction patterns, which are conceptualized and operationalized as network structural properties [55]. In particular, we consider the network structural properties of inclusiveness, reciprocity, centralization, and core-periphery, which have been shown to influence online participation behavior in various contexts, including knowledge-sharing forums [33], online policy deliberation forums [49], and healthcare forums [45]. We hypothesize their effects on participation by building on the social network perspective and WOM communication motives [23] that particularly relate to niche products [22].

The resulting research model relates the pertinent social network structural properties to levels of consumer participation in generating content pertaining to a niche cultural product, which is in turn posited to promote product consumption intentions. We collected data from a popular social media website in China that allows consumers to post comments and interact with one another in discussing books, movies, and music. UCINET v.6.212 was employed to obtain the focal network structural properties from the data, entailing social interaction among the users. User participation was reflected in the total amount of content (comments and replies) that was generated for a book. The website allows us to capture the consumption intentions of consumers via a feature that allows consumers to click on a button to indicate their intention to read a book.

The remainder of this paper is organized as follows. In Section 2, we present the conceptual foundation of this study, followed by the research model and hypotheses in Section 3. In Section 4, we describe the research method employed to analyze the data and test the research hypotheses, and in Section 4.3, we present the data analysis and results. Finally, in Section 5, we discuss the theoretical and practical implications of the study's findings and discuss the study's limitations to provide opportunities for future research.

2. Conceptual foundation

In this study, we employ the SNA paradigm as a foundation to systematically identify the different pertinent patterns of social interaction that are manifested as network structural properties. Building on the nature of the different social network structural properties and the perspective of WOM communication motives, particularly for niche products, we then develop hypotheses relating the patterns of social interaction to levels of participation.

2.1. Social network analysis (SNA)

The focus of SNA lies in social networks that consist of actors and the relationships among them as well as the conceptualization and quantification of these relationships for investigation purposes [55,56]. Based on graph theory [26], SNA denotes network actors as nodes and their relationships as ties [55]. An overarching premise of SNA is that individuals who are embedded within a social network influence one another and that the different patterns of interaction among the actors may lead to various outcomes, both at the individual level (e.g., job performance [1] and job promotion [14]) and at the collective level (e.g., the overall tendencies to share knowledge [33] and to provide input for policy making [49]). Over the years, various network structural properties have been derived to aid in understanding the nature of a social network and its analysis [55].

In the online social network context, previous studies have frequently investigated the effects of social network measures at the individual level (e.g., [1,40,51,54]), but less attention has been devoted to the collective level. Among the limited studies that have investigated collective-level network structural properties, [45] found that network density could promote participation by raising participants' sense of affective commitment and group esteem. Huang and DeSanctis [33] considered the effects of core-periphery and network centralization on knowledge contribution behavior and included network density as a control. While indicating significant effects of both network structural properties, the authors cautioned that density is a problematic index if a network possesses subgroups, such as a dense core. In such situations, a high level of network cohesion as suggested by the density measure could be a result of a dense subgroup, even if other actors (who do not belong to the dense subgroup) are only sparsely connected. Phang et al. [49] built on [33]'s study and considered a wider range of network structural properties, including network reciprocity in addition to core-periphery and centralization, and they investigated inclusiveness rather than density to avoid the issues highlighted by [33].

In this study, we extend this line of work not only by investigating the effects of core-periphery, reciprocity, and inclusiveness but also by delineating three different variants of network centralization: in-degree, out-degree, and betweenness (in [49], only undirected degree centralization was considered). These structural properties comprehensively capture different aspects of social interaction in a network, including the extent to which a network contains disconnected actors or isolates (inclusiveness); has members who reciprocate one another (reciprocity); is centralized around a few actors who receive or initiate many ties (in- and out-degree centralizations, respectively) or occupy middle positions between other actors (betweenness centralization); and is typified by the presence of both core and peripheral subgroups of members (core-periphery). Below, we explain each of these network structural properties in detail.

2.1.1. Inclusiveness

Inclusiveness reflects the degree of connectivity of a network and formally refers to the ratio of connected actors to the total number of actors present in the network [11,46]. Mathematically, Inclusiveness = N_c/N, where N_c denotes the number of connected actors and N is the total number of actors in the network.

A network with a high level of inclusiveness implies a minimal presence of isolates, which refers to nodes with no ties to others (refer to Fig. 1(a) for an example of an isolate) [11]. Another network property that also reflects the connectivity of a network is density, which concerns the proportion of all possible ties that are actually present [31]. Compared to inclusiveness, density also considers the numbers of ties that exist between actors rather than merely whether actors are connected. The difference between the two properties is illustrated in Fig. 1(b) and (c), which indicate that a network with optimal inclusiveness (Fig. 1(b)) may not be the same as a network with the highest density possible (Fig. 1(c)).

As noted previously, density could be a misleading index of connectivity if a network possesses subgroups [26]. In this study,

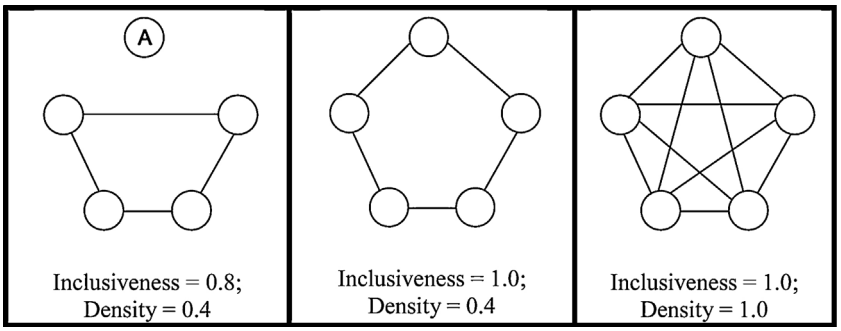


Fig. 1. (From left to right): (a) The presence of an isolate (i.e., A) in the network; (b) A network with maximum inclusiveness but non-maximum density; (c) a network with maximum density.

we are also interested in determining how the extent of the presence of participants who do not interact with others (i.e., isolates) may influence the participation level for niche cultural products; thus, the inclusiveness property is included rather than density.

2.1.2. Reciprocity

Reciprocity refers to the extent to which the relationships between actors in a social network are symmetric [55]. Consider a dyad of A and B; if A talked to B and B replied to A, then the interaction within the dyad is considered symmetric [55]. Mathematically, Reciprocity = D_S/N_C, where D_S refers to the number of symmetrical (reciprocated) dyads and N_C represents the number of connected nodes. Fig. 2 below depicts a network with a maximum level of reciprocity in which the interaction of every dyad (connected nodes) is symmetric.

2.1.3. Centralization

Network centralization is an extension of the individual centrality measure and refers to the extent to which a network is centralized around certain actors with high levels of centrality in terms of their connectivity with other network members [26,42]. Network centralization measures how central the actor with the highest centrality is in relation to how central the other actors are. An extreme case of network centralization is a "star" network in which all actors are connected to a single actor, i.e., maximum centralization (refer to Fig. 3 below). There are several widely employed variants of network centralization measures, including degree centralization, betweenness centralization, and closeness centralization. Of these variants, closeness centralization demands a high level of network connectivity [55] and is more practical when the network is adequately dense. However, online social networks typically have sparse connections, which may not allow closeness centralization to be reliably measured. Hence, we focus on degree centralization and betweenness centralization in this study.

Degree centralization refers to a network that concentrates on actors with high degree centrality. Degree centrality measures an actor's direct ties with others and is calculated by the number of nodes connected to a particular actor [47]. To investigate the effects of degree centralization on participation more comprehensively, we consider the direction of ties in the network and delineate between in-degree and out-degree centralization. Out-degree indicates ties that begin from a node to measure the "activities" initiated by an actor, whereas in-degree measures ties pointing toward the node [55].

Betweenness centralization concerns the extent to which a network is concentrated on actors with high levels of betweenness centrality. Betweenness centrality measures the fraction of the shortest paths between pairs of nodes that pass through the focal node [5,26,48]. Those who possess high betweenness centrality often act as middlemen or gatekeepers in a social network [55]. Fig. 3 illustrates the degree (in- and out-degree), betweenness, and closeness network centralization.

2.1.4. Core-periphery

The core-periphery structure consists of a cohesive core-subgroup in which actors are connected to one another in some maximal sense and a peripheral subgroup in which actors are more loosely connected to the coresubgroup [8,9]. There are two main approaches to measuring core-periphery structure: categorical and continuous. The categorical approach performs an absolute classification of the nodes into core and periphery subgroups,

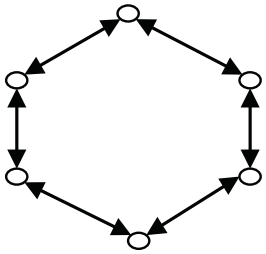


Fig. 2. A network with maximum reciprocity.

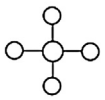
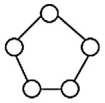
	Individual centrality	Network centralization	Max. and min.
Degree	$C_D(c_i)=\frac{\sum_{j=1}^{n} a(c_j,c_i)}{n-1}$, $ai(c_j,c_i)=\begin{cases}1, & c_j \& c_i \text{connected}\\ 0, & c_j \& c_i \text{unconnected}\end{cases}$	$C_{NetworkD}=\frac{\sum_{i=1}^{n}[C_D(c_{max})-C_D(c_i)]}{n^2-3n+2}$	Max=1, "star" network 
Betweenness	$C_B(c_i)=\frac{2\sum_{j<k}\left(\frac{g_{jk}(c_i)}{g_{jk}}\right)}{n^2-3n+2}$, $g_{jk}(c_i)$= Number of shortest paths between j and k through i, g_{jk}=No. of shortest paths between j and k	$C_{NetworkB}=\frac{\sum_{i=1}^{n}[C_B(c_{max})-C_B(c_i)]}{n^3-4n^2+5n-2}$	Min=0, ringlike network 
Closeness	$C_C(c_i)=\left[\frac{\sum_{i\neq j}^{n} d(c_i,c_j)}{n-1}\right]^{-1}$, $d(c_i,c_j)$=No. of ties in shortest path between i and j	$C_{NetworkC}=\frac{\sum_{i=1}^{n}[C_c(c_{max})-C_c(c_i))]}{(n^2-3n+2)/(2n-3)}$	

Fig. 3. Illustration of the different network centralizations.

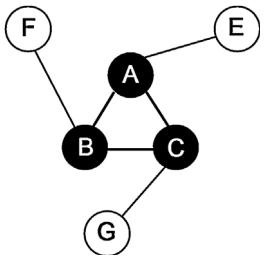


Fig. 4. A core-periphery structure [33].

whereas the continuous approach computes a coreness score for each node to increase the accuracy of the algorithm. Fig. 4 presents an example of core-periphery structure.

One may note that the core-periphery structure is somehow related to the centrality measure in that all actors in a coresubgroup are necessarily highly central except when the model fits vacuously [33]. However, the converse is not true because not every set of centralized actors may form a core in a network. For instance, it is possible to collect a set of highly centralized actors in a network, according to some measures of centrality, such as degree or closeness, yet find that the coresubgroup induced by the set contains no ties at all (i.e., an empty core). This situation occurs because each actor may have a high level of centrality by being strongly connected to different cohesive regions of the group and yet not have any ties with one another [9,33].

Based on the unique nature of the different network structural properties above, we hypothesize their effects on consumer participation in generating content for niche cultural products based on the WOM communication motives, which will be discussed next.

2.2. WOM communication motives

The contribution of content on social media, such as product review information by consumers, can be likened to offline WOM communication [22]. A seminal framework for understanding WOM communication motives was developed by [23] and has been well supported by subsequent studies, such as [24,32,52], including in the context of electronic WOM [32]. The framework explicates four main motivational categories of WOM communication: (1) Product involvement, (2) Message involvement, (3) Self-involvement, and (4) Other involvement.

Product involvement is related to how WOM may act as a tension-releasing mechanism when the consumer has had particularly positive or negative experience with a product. For cultural products that convey "ideas, symbols, and ways of life" [57, p. 85], it can be expected that consumers are likely to demonstrate high levels of product involvement. For instance, when a consumer reads a good book (or a controversial book), she is likely to feel an urge to share and release her feelings or views about the book. *Message involvement* concerns the discussion on a product that may be stimulated by factors such as the persistent nature of content on online platforms compared with the transient nature of offline WOM [22]. It has been shown that the persistence of prior product reviews could stimulate subsequent reviewers to contribute and participate in discussions with others [32]. In this study, we believe that, beyond the persistence of content on social media, the different patterns of interaction among the participants on such platforms may non-trivially stimulate (or undermine) their involvement in the message (e.g., reviews).

Self-involvement stipulates that consumers are motivated to participate in product-related conversations in benefiting others by a need to depict an enhanced version of themselves for the benefit of others. Such motivations may be particularly salient for consumers contributing reviews on niche products. Previous research shows that consumers prefer to discuss niche products because such discussions may make them appear intelligent and savvy [22]. Additionally, contributing information on niche products could provide consumers with the feeling that they are pioneers (because few others have used such products) and could signal their possession of inside information (because few others have good knowledge of the products) [23]. As noted by [23], "... consumers are proud to use what they consider an 'underdog' product. They feel gratified in defying the majority by publicly using an unpopular brand; but the real self-confirmation lies in converting others to their own 'peculiar' choice" [p. 150]. Such behavior is also consistent with the last motivational category, *other involvement*, in which a consumer discusses a product because of a genuine desire to help others understand the product and make better purchase decisions. Providing information to other consumers about niche products for which the general knowledge may be limited is more helpful than providing such information for popular, well-known products [22,23].

Building on the above WOM communication motives, we hypothesize the effects of the different network structural properties on participation depending on whether their nature is likely to encourage or undermine the fulfillment of the salient motivations for contributing information on niche cultural products. Our overarching theoretical logic is that the patterns of interaction among participants, which are persistently recorded on social media, can be observed by an individual participant and in turn promote or undermine his or her enthusiasm to participate, depending on the nature of the interaction patterns. Based on the premise of the social network paradigm that individuals influence one another in a network thereby leading to collective action [14], we expect individuals' varied involvement in accordance to different interaction patterns in the network to result in different overall participation levels.

3. Research model and hypotheses

Our research model posits that the level of participation in a social media website in terms of the total amount of content (including comments and discussions) generated for a niche product would enhance product consumption intentions. The level of participation is in turn determined by the following focal network structural properties: inclusiveness, reciprocity, centralization (in-degree, out-degree, and betweenness), and core-periphery. Fig. 5 depicts our research model.

3.1. Level of participation and consumption intention

In the context of social media, users play a central role in generating content that sustains the media platform [38]. Previous research has shown that user-generated content (e.g., product reviews) can help promote sales [12,25]. The rationale is that the information contributed by consumers is deemed more trustworthy [12] and that it may increase product salience in the minds of consumers and raise their interest in a product [25]. Specifically, the sharing of information by consumers who have experienced a product or service may inform other consumers about "*the social and psychological consequences of the purchase decision*" [12]. Such information is permanently recorded on social media platforms, making them easier to be viewed and referenced by consumers, which should promote consumer involvement in message content according the WOM communication motive framework [22,23]. Thus, an abundant sharing of product information may increase

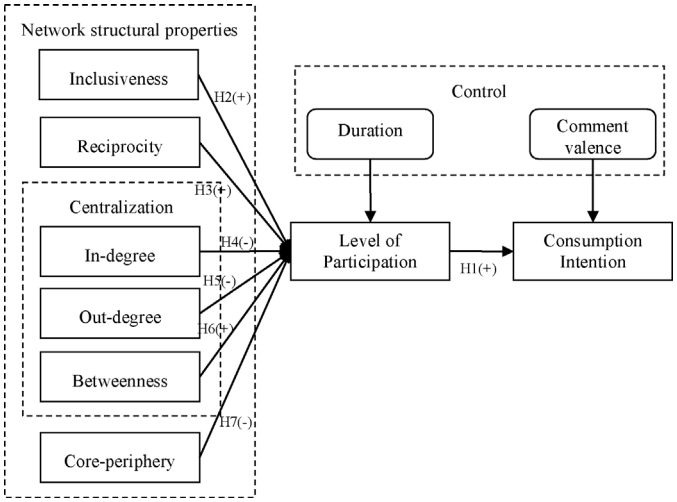


Fig. 5. Research model.

consumers' interest and assist them in becoming more informed about such products to guide their purchase decisions [27]. This outcome of sharing may be particularly pertinent for niche cultural products that have not previously received adequate attention and coverage from the mainstream media [4]. Thus, we propose the following hypothesis:

H1. The higher the level of participation attained in a social media platform for discussion of a niche cultural product, the higher the product consumption intention.

3.2. Effect of inclusiveness on the level of participation

We expect inclusiveness to have a positive effect on the level of consumer participation in content generation for niche cultural products. A high level of inclusiveness implies a sparse presence of isolates, who have been noted to pose a deterring effect on a group's enthusiasm to contribute [50]. When most actors in a network interact with others, this context could stimulate ideas and contributions among the participants compared with a network in which most actors are isolates [6].

In a social media platform for discussions on niche cultural products, a vibrant community in which participants engage in interactions may make an individualfeel more confident that his or her contributions will receive attention from others rather than being ignored. The existence of interactions in which participants respond to others' contributions implies that people are willing to consider what others think rather than isolating themselves with respect to their beliefs about a niche cultural product. This willingness is particularly pertinent for the self-involvement aspect of discussing niche cultural products, given that people particularly seek to appear intelligent and savvy in front of others in this context [22,23]. Initiating such a discussion could also make a participant feel more confident in deriving other fulfillment [22,23] because his or her contributions that intend to help others (e.g., to understand a niche cultural product) are more likely to be assimilated into the minds of others. At a collective level, with participants tending to influence one another in a social network [14] and with these interpersonal influences made salient by social media that permanently record participant interactions [22], we expect that enhanced participant involvement with high inclusiveness will lead to greater overall participation levels:

H2. The greater the inclusiveness, the higher the level of participation attained in a social media platform for discussions of a niche cultural product.

3.3. Effect of reciprocity on the level of participation

Reciprocity is generally considered to be favorable for participation and collective behavior. A reciprocal interaction helps promote more complete information exchange and understanding between two participants and makes it easier to evoke innovate ideas [7]. Specifically, the exchanges of information with two-way communications could help the participants involved to gain a deeper understanding of the focal niche cultural product and could motivate them to contribute further through the desire to outsmart one another in being the person who understands the product better. For instance, two participants who discuss a philosophical book may hold contrasting views about the values or meanings conveyed by the book. Through reciprocal exchanges, they come to acquire information that was previously unknown to them and to understand one another's views and ideas better. This new information may then prompt them to further deliberate on their own understanding, read the book from a deeper perspective, and subsequently provide more comprehensive information or ideas about the book. In this view, high reciprocity may further encourage a participant's motivation to achieve self-enhancement in discussing a niche cultural product (i.e., self-involvement) [22,52]. With social media facilitating interpersonal influence among participants, such discussions may in turn lead to greater participation levels at the collective level:

H3. The greater the reciprocity, the higher the level of participation attained in a social media platform for discussions of a niche cultural product.

3.4. Effects of centralization on the level of participation

To more comprehensively investigate the effects of the centralization structure on participation levels, we delineate degree (in-degree, out-degree) and betweenness centralization.

High degree centralization implies that a network contains centralized actors who are connected to most others and who act as network "hubs" such that most of the interactions revolve around them [55]. The presence of such dominating actors on a social media platform may undermine other participants' motivations to discuss a niche cultural product. By possessing a large number of in-degree ties or out-degree ties, the dominating actors or opinion leaders [26] tend to influence others to adopt what they think is right or appropriate for a niche cultural product. Previous research has noted that the presence of centralized actors could lead to a higher level of information redundancy in a network because the network members who are connected to the centralized actors are exposed to similar information held by these actors [13]. This redundancy may be particularly salient in those networks that are dominated by one or a few centralized actors possessing a large number of in-degree ties (high in-degree centralization), in which many network members initiate ties with them and become receiving parties of their information. These individuals have been associated with having high prestige or reputation in previous research [55]. Such centralized actors may also exert their influence by actively initiating ties with others (i.e., out-degree ties [55]) and disseminate their views and ideas about a niche cultural product in the process.

In either situations, the domination of a network by a few highly centralized actors could increase the difficulty for participants wishing to appear intelligent and savvy in view of their

interlocutors, which is a salient motivation for discussing niche products [22,23]. This challenge arises because attempts to gain attention from others are likely to be overshadowed by the presence of those highly reputed (in-degree) or active (out-degree) centralized actors in the community. Consequently, many participants who have originally intended to contribute may choose not to do so [39]. Thus, the participants' undermined self-involvement motivations to contribute information regarding a niche cultural product may then lead to a lower level of participation overall:

H4. The greater the in-degree centralization, the lower the level of participation attained in a social media platform for discussions of a niche cultural product.

H5. The greater the out-degree centralization, the lower the level of participation attained in a social media platform for discussions of a niche cultural product.

In contrast to degree centralization, we expect betweenness centralization to have a positive effect on levels of participation. When a network has prominent actors with high betweenness centrality, information may flow more seamlessly among the participants. These actors often act as middlemen or gatekeepers in a social network [55], and they tend to regulate information flow throughout the network and play an important role in spreading information by bridging structural holes (i.e., nodes that are previously unconnected) [14]. Specifically, these actors may help build ties in typically sparse online social networks [29,40]. To illustrate, A and C are two participants in a social media platform that has been established to discuss niche cultural products. A and C have not previously interacted with one another and have never paid attention to one another's posting. Another participant, B, found A's comment to be interesting and included the information in A's comment when engaging in conversation with C. Effectively, B acted as a middleman who facilitated the flow of information between A and C and could have in the process brought them to interact with one another.

The presence of these actors with high betweenness who are not typified by their dominating influences, as with those with high degree centralization, may enable participants to fulfill their self-involvement and other involvement motivations for contributing information on niche products. Indeed, with their presence promoting the flow of information, a participant may become increasingly likely to gain the attention and interest of others. Furthermore, by exposing these individuals to ideas and perspectives that may be otherwise unknown to them, they may be stimulated to think of better ideas and contribute more comprehensive information to appear more intelligent in view of others. Apart from enhanced self-fulfillment, the linkages that are created between the participants may also promote the feelings that their contributions can help more people (i.e., otherfulfillment), such as informing others about the less known aspects of a niche cultural product. Given that the presence of actors with high betweenness centralization can facilitate the spread of information and influence among individual participants while enhancing their self- and other-involvement, we hypothesize as follows:

H6. The greater the betweenness centralization, the higher the level of participation attained in a social media platform for discussions of a niche cultural product.

3.5. Effect of core-periphery on the level of participation

Previous studies have provided contradictory views of the effects of a core-periphery network structure. Some scholars believe that the core-periphery structure may promote positive outcomes because the existence of a coresubgroup with high network closure may serve to improve communication, leading to more reliable and coordinated exchanges of information [16]. Specifically, the coresubgroup may play a leadership role in distributing information and ideas from the peripheries and in driving other members to participate. This network structural property has been found to promote knowledge sharing and contribution of policy ideas in online contexts [33,49]. By contrast, other scholars view the core-periphery structure as potentially detrimental to group communication as a result of the marginalization of peripheral members by coresubgroups [18]. Such an effect may be particularly pertinent in those networks that are formed by members with unique functional expertise, all of which should be brought to bear on a given problem. Given their competing nature, a coresubgroup may limit the contributions of peripheral members by marginalizing their information or opinions despite their potential to contribute valuable input [18].

In our focal context of discussions on niche cultural products, we expect a core-periphery structure to negatively affect participation levels. We find the position by [18] above to be more relevant to our context, in which participants especially desire to appear intelligent and savvy to one another [22,23]. As such participants compete for attention and recognition, the coresubgroups would be tempted to marginalize the information and ideas arising from the peripheries. Encountering such marginalization attempts by the small subset of inter-connected individuals, an individual would feel discouraged and hesitant to participate because it is more difficult for him/her to obtain the desired recognition. By extension to the collective level, the resulting dampened self-involvement of many participants would lead to a lower level of overall participation in the community. Therefore, we hypothesize as follows:

H7. The greater the core-periphery structure, the lower the level of participation attained in a social media platform for discussions of a niche cultural product.

4. Research method

In this study, we employed SNA with UCINET v.6.212 [10] to compute the measures of the focal network structural properties—i.e., inclusiveness, reciprocity, centralization (in-degree, out-degree, and betweenness), and core-periphery—from the social interaction data collected from the research site. In addition, we performed regression analyses using SPSS v.20.0 to test the relationships between the network structural properties and the level of participation and between the level of participation and consumption intentions.

4.1. Research context

The data for analysis were collected from a leading consumer-generated product review website in China called Douban (www.douban.com). Founded in March 2005, Douban began as a platform for consumers to provide comments and exchange their views on books, and it was subsequently extended to also include movies and music. Douban represents an ideal example of social commerce websites that have pivoted to social media to ensure business viability. The website relies on consumers to generate content (e.g., book reviews) that sustains the community platform, and the site earns revenues through the activities that are performed by consumers. With the book section as an example, consumers may initiate a page dedicated to a book and write his or her comments on the book. Other consumers may add content to the page as additional comments or as responses to the original

comment made by the page creator. Other participants may also engage in discourses related to the book with one another. When a consumer has purchased a book by following a link that was designed to appear on the page and that directs the consumer to the cooperating merchants' website (e.g., Amazon.cn) for transaction completion, Douban earns a referral fee from the merchants.

In this study, we chose the book section of the website and focused on books in the "philosophy" genre because they represent a type of niche cultural product, as previously discussed. In selecting the sample for data analysis, we first referred to a consolidated ranking list of the books (with the philosophy tag) that is provided by the target website. To select the most typical cases, we included books that appeared in the middle range of the ranking list as the consideration set. This method allowed us to exclude those relatively extreme cases that appeared in the upper and lower ends of the list. We then randomly selected from the consideration set by spreading the selections across the list as much as possible. In the selection process, we also excluded those books that obtained fewer than 10 postings (not including replies) for meaningful social network analysis. A total of 106 book pages were selected for data analysis.

4.2. Variables

4.2.1. Dependent variables

Douban provides a feature on every book comment page that allows users to click on a button (labeled "wish to read") to indicate their intention to read the book concerned (refer to Fig. 6 for a snapshot of a sample book comment page). This feature allows us to capture the consumption intention of a book using the total number of users who clicked on the button to indicate their intention to read as a proxy. For the level of participation, we recorded the total amount of content generated (including the book reviews and all replies) in each of the 106 randomly collected book comment pages.

4.2.2. Independent variables

For each of the included book comment pages, we computed the social network measures based on the social interaction data recorded. In electronic networks, a dyadic link is created between two individuals when one has responded to another's posting [1]. Because of the absence of a direct reply function in Douban, we read the content postings by the participants to determine the network links. For instance, if A responded to comments made by B and C in her posting, then network links from A to B and from A to C are created. Table 1 provides some examples of the links that were coded.

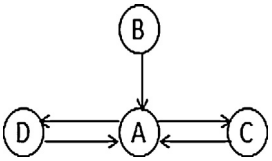
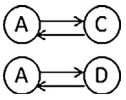
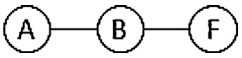
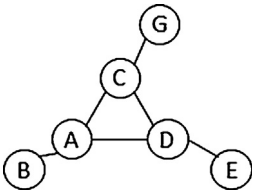
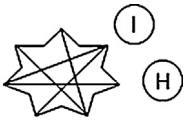
To ensure that the content analysis process [30] is reliable, several meetings were held in the beginning between two researchers who performed the coding to determine the network links. The two coders independently read all of the activity records, from the beginning to the end of the book comment pages, to determine who interacted with whom, and they subsequently validated the coding with one another. The coding of the interactions is based on a principle that is akin to the principle of contextualizing that is employed in interpretive case studies [41], i.e., to observe how the current situation under investigation emerged (in our case, how the participants have interacted with one another) with an in-depth understanding of the contexts, including the content of the postings and their temporal sequences (how the postings and conversations evolved over time). Discrepancies in the coding were reviewed and resolved after each meeting. Inter-coder reliability based on Cohen's kappa [16] was 0.86 at the end of the exercise. As a Kappa score of 0.65 and above is considered acceptable [35], one of the researchers proceeded to code the remainder of the content postings.

Accordingly, an adjacency matrix (refer to Fig. 7 for an example) was created to represent the social interactions that occurred in each of the book comment pages. We placed all network participants in the first row and in the first column in the adjacency matrix in sequential order. The presence of a link from person A to person B is labeled as 1 in row A, column B; 0 represents no interaction between them in the matrix. Eventually, 106 adjacency matrices were generated for input into UCINET for computation of the independent variables: inclusiveness, reciprocity, in-degree centralization, out-degree centralization, betweenness centralization, and core-periphery.

In addition, we included two control variables, comment valence (captured through the average user rating of a book) and the duration of page existence (the period from page creation to

Fig. 6. A snapshot of a sample book comment page on Douban.

Table 1
Examples of posting contents and their links that demonstrate the focal network structures.

ID	Nodes	Sample contents	Notes
1	A	I was first attracted by SH's [the book author] beautiful sentences and solid writing skill in the preface. Compared to similar books, he makes philosophy vivid and interesting. Moreover, the book offers deep insights into life and the world. It leads us to think "what the world really is". In SH's diary, the world consists of self-understanding and self-realization of will, and humans are the ultimate undertakers. In other words, the meaning of existence is to understand the world and to continuously develop it. Pessimism is metaphysical.	 * This segment of interactions (IDs 1–7) can be drawn into a social network diagram as depicted above.
2	B to A	Good comments, and I hope to read it!	
3	C to A	Your comments [on the book] are quite reasonable. From my personalview, to understand this book, we should make clear that SH's metaphysics is based on a hard determinism world view.	 * From IDs 3 – 7, we can observe two instances of reciprocity, i.e., between A and C and between A and D.
4	D to A	I'd recommend you have a look at SH's PhD graduation paper too. There're some concepts there to help you understand this book further.	
5	A to C	Thank you for the information! I will pay more attention to his hard deterministic view.	
6	A to D	Thanks a lot for the recommendation; I will go to the library to have a look at his graduation paper.	
7	D to A	No worries, there are a lot of things to learn from SH's system of world view.	
8	F	I read the book in earnest when I was a senior student. However, I still cannot understand some points in the book. Why is there no spirit of giving up in SH's pessimism?	 * This segment (IDs 8 and 9) illustrates that B serves as a middle person who passes A's information to F.
9	B to F	The thoughts in the book are really insightful. I'd recommend that you read A's book comment;it's quite helpful to better understandthe questionyou've raised.	
10	E to D	I have read that one; some of his later works are based on the graduation paper as mentioned.	
11	C	Such a fabulous book! I resonate with the author a lot! Sincerely recommend everyone to read the book; it will help you find your own philosophy! It is also a masterpiece that introduces Buddhist thoughts and brings about exchanges of thoughts across different philosophical systems.	
12	A to C	I agree that the thoughts can be exchanged across philosophical systems. But I think SH's system is more likely to be Brahmo.	* When adding this segment of interactions (IDs 10–15) to the previous interactions, we can observe the formation of a core-periphery structure.
13	D to C	"Everyone has his own philosophy;" I cannot agree more.	
14	G to C	Good review, "C", just want to buy one.	
15	C to A	Oh, thanks! Yes you are right; it cannot be called Buddhism, strictly speaking.	
16	H	Reading the book. There was a great motivation to read the whole book. thanks to SH's beautiful writing!	
17	I	It is really hard for me to understand philosophy.	* H and I are isolates who were outside of the network, i.e., they were not connected to other members.

	A	B	C	D	E	F
A	0	0	0	1	0	0
B	1	0	1	0	0	0
C	0	0	0	0	0	0
D	1	0	0	0	0	0
E	0	0	0	0	0	0
F	0	0	0	0	0	0

Fig. 7. Example of an adjacency matrix.

the time of data collection), which may influence the respective dependent variables (see Fig. 5).

4.3. Data analysis and results

We performed regression analyses to test the hypotheses. Prior to the hypothesis testing, we performed a log transformation of the dependent variables to reduce data skewness (the skewness values of the level of participation and consumption intention changed from 2.254 and 2.974 to acceptable levels of 0.484 and −0.078, respectively, after the transformations) and standardized all measures to avoid scale issues. Table 2 presents the descriptive statistics of the variables investigated, and Table 3 provides the correlations among the variables.

Table 2
Descriptive statistics of variables ($N = 106$).

	Mean	Standard deviation
Inclusiveness	0.86	0.11
Reciprocity	0.13	0.09
In-degree	0.14	0.08
Out-degree	0.04	0.03
Betweenness	0.01	0.02
Core-periphery	0.41	0.15
Level of participation	73.32	58.94
Consumption intention	1524.05	1416.22
Duration (days)	1036.09	312.90
Comment valence	4.26	0.21

We also assessed whether multicollinearity could be a problem. As all VIF values are well below 5.0 (the highest is 1.77), this issue is unlikely to arise as a problem in this study. Thus, we proceeded with the hypothesis testing. Table 4 below presents the results of the hypothesis testing.

The results show that as hypothesized, the level of participation attained in commenting and discussing a niche cultural product led to increased book consumption intentions (i.e., H1 is supported). Among the focal network structural properties, inclusiveness and betweenness centralization were found to have a positive effect on the level of participation (i.e., H2 and H6 are supported), whereas out-degree centralization and core-periphery have a negative effect, as expected (i.e., H5 and H7 are supported). However, reciprocity and in-degree centralization do not have a significant effect on the level of participation (i.e., H3 and H4 are not supported).

5. Discussion

The purpose of this study has been to consider the context of social media platforms for promoting niche cultural products to investigate how user interaction patterns could promote overall user participation levels in content generation to allow commercial value to be better derived in this context. By analyzing data collected from a website based on social media, our findings provide support for the hypothesis that user participation in such a platform (e.g., in generating content such as product reviews) can indeed lead to favorable commercial benefits. Given the importance of attaining a high level of user participation in content generation, it makes sense for the hosting firm to encourage greater interactions among users, with the hope that they can stimulate one another to contribute more content to the social media platform. However, not all types of interaction could lead to higher participation in content generation. Our findings indicated that in the context of discussions on niche cultural products, although inclusiveness and betweenness centralization can promote overall participation, out-degree centralization and core-periphery structures have a detrimental effect.

Two other network structural properties that were included in this study (i.e., reciprocity and in-degree centralization) were not found to have a significant effect. For reciprocity, it is possible be that when two actors engage in a mutual discourse on a niche cultural product, such as a philosophical book, they become highly involved in the discourse because of the strong personal subjectivity inherent to discussions of such books. More personal interactions involving two participants may also deter others from joining the discussion, as with core-periphery structures.

Table 3
Correlations among the variables.

	1	2	3	4	5	6	7	8	9
Level of participation	–	–	–	–	–	–	–	–	–
Consumption intention	0.58***	–	–	–	–	–	–	–	–
Inclusiveness	0.52***	0.11	–	–	–	–	–	–	–
Reciprocity	−0.01	0.18*	−0.23**	–	–	–	–	–	–
In-degree	−0.21*	−0.21*	−0.29**	0.08	–	–	–	–	–
Out-degree	−0.32***	−0.06	−0.42***	0.48***	0.38***	–	–	–	–
Betweenness	0.18*	0.04	0.01	0.42***	0.26**	0.36***	–	–	–
Core-periphery	−0.26**	−0.41***	−0.05	0.28**	−0.00	0.19*	0.39***	–	–
Comment valence	−0.01	0.21*	0.10	0.06	0.02	0.09	−0.02	−0.09	–
Duration	−0.12	0.06	−0.01	0.09	−0.09	0.12	−0.02	0.05	0.23*

Note: Level of participation and consumption intentions was log-transformed.

Table 4
Results of hypothesis testing.

Variable tested	Hypothesis supported?	*T*	Sig.	Collinearity statistics	
				Tolerance	VIF
*Dependent variable: Consumption intention (lg(Number of users who indicated the intention to read)), $R^2 = 0.28$					
Level of participation	H1: Yes	6.106	0.000***	0.997	1.003
Comment valence	(Control)	2.822	0.006**	0.997	1.003
*Dependent variable:Level of participation (lg(Total amount of content generated)), $R^2 = 0.45$					
Inclusiveness	H2: Yes	4.909	0.000***	0.754	1.327
Reciprocity	H3: No	1.798	0.075	0.653	1.531
In-degree	H4: No	−1.516	0.133	0.749	1.336
Out-degree	H5: Yes	−2.291	0.024*	0.565	1.770
Betweenness	H6: Yes	4.020	0.000***	0.640	1.563
Core-periphery	H7: Yes	−4.715	0.000***	0.819	1.222
Duration (days)	(Control)	−1.236	0.219	0.958	1.044

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

However, the negative effect may not be as significant as that observed for the core-periphery involving a core subgroup of members who are capable of marginalizing others' information or ideas, but this negative effect nonetheless impairs the supposedly positive effect of reciprocity in this context. In terms of degree centralization, it is interesting to note that although out-degree centralization has a detrimental effect as expected, such an outcome is not observed for in-degree centralization. This result suggests that participants' motivations to appear intelligent and savvy in front of others are undermined only when the dominating actors in a centralized network attempt to actively influence other members (i.e., out-degree centralization). The unfavorable information redundancy effect that is supposedly caused primarily by in-degree centralization may not be salient in this context. The information and perspectives received from an actor with high in-degree centrality with respect to a niche cultural product may lead to different subjective interpretations by others, which could help promote participation to a certain but limited extent.

5.1. Theoretical implications

Our study adds to the extant literature on social media by empirically demonstrating how user participation in content generation may lead to potential commercial benefits for firms employing social media for their business. In our research context (i.e., Douban), higher levels of user participation in content generation were shown to promote consumption intentions in terms of people indicating their intentions to consume a product (i.e., to read a book). Furthermore, we demonstrated such an effect in the context of using social media for promoting niche products, which has been recognized to be particularly promising but remains relatively unexplored in the literature [22].

The research extends the findings by [22], which indicate that consumers prefer to contribute post-consumption review information for niche products. Grounded in the WOM communication framework that was originally developed by [23] and extended by [22] for niche products, we show that the patterns of interaction among consumers are relevant in influencing participation in this context. Not every type of interaction that occurs when people discuss a niche product can lead to a high level of participation. The participation level depends on whether the nature of the interactions can serve to promote or undermine participants' motivations to discuss a niche product. Indeed, as we have argued, a highly connected network of interactions in terms of inclusiveness and betweenness centralization could promote participation. Conversely, a highly centralized network in terms of out-degree ties and a core-periphery structure could undermine the level of participation attained. The finding regarding the negative effect of core-periphery is in contrast to the results of previous studies that indicated its positive influence in other online contexts (e.g., knowledge sharing forums [33] and online policy deliberation forums [49]), which demonstrates the importance of considering the unique context of niche cultural products.

In relation to the preceding implications, our study also offers a more refined understanding of the effect of the network centralization structure. In the context of using social medial for facilitating user interaction surrounding niche cultural products, we show that betweenness centralization has a positive effect on user participation, but degree centralization does not show the same effect. Furthermore, the effect of degree centralization, which is widely held to be negative in the extant literature [17,33,53], depends on whether one examines in-degree or out-degree ties. Our findings indicate that the negative effect of out-degree centralization is significant but that the effect of in-degree centralization is not significant, thus further affirming the value of differentiating between the two types of centralization to obtain a deeper understanding of the effects of degree centralization.

5.2. Practical implications

Noting the importance of encouraging more participation in social media, our study provides guidance to practitioners who are contemplating employing social media to promote niche cultural products with regard to the types of user interaction that should be encouraged or avoided in this specific context. Essentially, our message is that encouraging participation is not simply a matter of providing incentives or administering interventions to stimulate user interaction, but more importantly, such encouragement must stimulate the appropriate types of interaction.

Our study shows that although it is important to encourage people to post their comments or knowledge about a niche cultural product, it is more important to ensure that they become connected while doing so (i.e., attaining a high level of inclusiveness). This connectedness may be achieved through a careful design of features that can enable people to engage in conversations with one another. For instance, the tagging of details such as contributors' identity information and their past contribution history in their message postings may allow participants to easily identify one another's interests. Mechanisms should also be provided for participants to easily communicate with others through the platform (e.g., by clicking on "reply" or "message" buttons).

It is also important to promote a betweenness centralization structure by identifying those who serve as bridges in the network. Incentives may be provided to these participants to encourage them to more actively serve this role (i.e., in facilitating the flow of information between members who did not previously notice one another but share some common interests) and foster their interaction. For instance, a ranking mechanism could be designed such that more credit points are awarded to the bridging activities, thus accelerating the rise of member status of those who engage in these activities.

Finally, the managers of social media platforms for niche cultural products must exercise caution with respect to the emergence of out-degree centralization and core-periphery structures in the network, which could harm overall participation levels. When these structures emerge, the platform manager may attempt to make the participation level of members more evenly distributed rather than concentrating on a few out-degree centralized actors and core subgroup members who may actively discourage or marginalize others' participation. Moderators may be hired to actively identify people who have raised interesting views but are not receiving the attention that they deserve and encourage them to interact with other members who share similar interests with them. However, it should be cautioned that the activities performed by the moderators should not be too obtrusive to the extent that it makes the members feel threatened about their freedom and volition of participating on the social media platform.

5.3. Limitations and future research

The findings from this study must be interpreted in view of its limitations, which may also indicate potential future research directions. First, this study limits its focus on the network level of structural properties. Although such properties could be useful in explaining overall participation levels and the ensuing effects, other measures that are excluded from this study, such as

those at the individual (e.g., Simmelian tie) and subgroup (e.g., cliques) levels, may provide more detailed insights into the micro-dynamics of user interaction and participation in social media. Future research may examine these network measures in investigating how user interaction properties at the individual and subgroup levels may enable firms to better derive commercial value from their social media endeavors.

Second, we capture the commercial value of a social media website using the number of consumers who indicated their intention to consume a product as a proxy of consumption intention. It would have been more ideal to employ more direct measures, such as the actual number of consumers who have bought a product through the social media website, to capture commercial value. The lack of access to such a direct measure is thus a limitation of this study, which could therefore be an area for further improvement in future research.

Finally, our investigation was set in a social media website in China, which may limit the generalizability of the findings because of potential cultural influences. Certain cultural factors that may influence the ways in which people interact and communicate with one another, such as context culture [28], could affect the emergence of social network properties on a social media platform. Future research may conduct studies in other cultural contexts to examine whether our findings remain valid after considering cultural influences.

Despite the limitations, our study offers important theoretical and practical insights that may facilitate organizations' effort to leverage user participation in social media to promote niche cultural products as well as niche products in general.

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